

Title: Expanding the Understanding of High School Non-Graduates Through a Comparison of High School Dropouts and Persisters

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Suggested Citation:

Uretsky, M.C. & Henneberger, A.K. (in press). Expanding the understanding of high school non-graduates through a comparison of high school dropouts and persisters. *Journal of Education for Students Placed at Risk*.

Acknowledgments and credits.

This research was made possible with data, technical, and research support provided by the Maryland Longitudinal Data System (MLDS) Center. The views and opinions expressed are those of the authors and do not reflect the opinion of the State of Maryland, the MLDS Center, the MLDS Governing Board, or its partner agencies. This manuscript benefited from comments from the MLDS Center and its partner agencies and from the comments of anonymous reviewers.

Abstract

Although persisters now represent the largest group of non-graduating high school students, they have received little attention in the research literature, leaving unanswered the question of how persisters differ from dropouts in terms of demographic characteristics, academic preparation, and key life outcomes. Using statewide linked-administrative education and labor market data, we applied multilevel modeling to examine the differences in demographic and academic characteristics between persisters and late (Year 4) dropouts. We identified several student- (i.e. race, special education participation, previous dropout, standardized test scores, on-track status, and attendance) and school- (i.e. school type, school size) level characteristics that related to the odds of persisting and dropping out in students' fourth year of high school. Additionally, we used a descriptive approach and data visualization to illustrate the near-term academic, postsecondary enrollment, and labor market pathways of 4-year non-graduates. Our findings highlight the unique characteristics and outcomes of persisting non-graduates and underscore an enhanced understanding of non-graduation through examining both persisting students and dropouts.

Keywords: Persisters, Dropout, Persisting non-graduates, labor market participation, Postsecondary participation

Word Count: 7,639 excluding references, tables, and figures

Many states and districts have turned to empirically based models, such as early warning indicators (EWI; e.g. Allensworth & Easton, 2007; Balfanz et al., 2007, Bowers et al., 2013) or typologies (e.g. Bowers & Sprott, 2012b; Ogresta et al., 2020), to identify and target services towards students who are at high risk for not graduating from high school. However, most predictive studies targeting non-graduates have focused on identifying potential dropouts. A series of recent studies (Hill & Mirakhur, 2018; Uretsky, 2019; Uretsky et al., 2016; Uretsky & Henneberger, 2020) have identified a second group of non-graduates—*persisters*—who are still enrolled, but have not earned a diploma by their expected graduation date. Persisters represent a sizeable population (between 8 and 22% of fourth year students) that is equal to or greater than the proportion of students who dropout (3-11%; Hill & Mirakhur, 2018; Uretsky, 2019; Uretsky & Henneberger, 2020).

Although persisters now represent the largest group of non-graduating high school students, they have received little attention in the research literature, leaving unanswered the question of how persisters differ from dropouts in terms of demographic characteristics, academic preparation, and key life outcomes. Understanding and documenting such differences would help us to understand whether persisters and dropouts should be treated as unique populations in research and administrative decision making. In addition, mapping the academic pathways and early labor market experiences of persisters, alongside dropouts, will provide new insight into the life experiences of non-graduates after the traditional four years of high school is complete. The knowledge gained from the current study will be critical for improving the predictive utility of existing models identifying students who are at-risk for not graduating from high school and a requisite next step towards developing interventions and defining policy to improve life outcomes for dropouts and persisters alike.

1. Background and Theoretical Perspectives

The conceptual model of academic success (Rumberger, 2011) and the life course perspective on dropout (Alexander et al., 2001; Dupéré et al., 2015) both characterize dropout as a lengthy process that unfolds over time. At the end of the fourth year of high school, a student could graduate with their class, drop out, or continue their path towards a diploma. For students who do not graduate on time, this path can continue through the following academic year and beyond. According to these theories, leaving school without a diploma is not an ahistorical reaction to current events, nor can it be attributed to a single cause. The consensus among researchers instead describes a bouquet of factors that conspire over time to disrupt students' academic progress and encourage dropout (De Witte et al., 2013; McDermott et al., 2019a; Zaff et al., 2016a), with both Rumberger's theory and the life course perspective theories (Alexander et al., 2001; Dupéré et al., 2015) emphasizing individual- and school-level factors over time.

For example, Rumberger (2011) described the importance of student characteristics such as attendance, between-school mobility, performance on high stakes testing, and previous dropout experiences, as well as institutional characteristics such as school composition and structure, as contributing to the process of dropout. Alexander and colleagues (2001) describe dropout as a culmination of a long-term process of disengagement from school that may result from academic, parental, and personal resources. Dupéré and colleagues (2015) describe dropout as a result of early individual characteristics, such as self-regulation and student behavior, as well as contextual experiences, including experiences with family, school, and peers, combined with later precipitating factors, such as school mobility, bullying, or academic failure. More proximal factors that could serve as mediators include engagement, achievement, behavior, and absenteeism. Initial research has confirmed that similar factors may also be relevant to the study

of persisters (Uretsky, 2019; Uretsky & Henneberger, 2020), but research has not yet directly compared persisters to dropouts. Thus, our current understanding of high school non-completion is largely limited to students who drop out.

The dropout typology research may lead us closer to understanding how we might theoretically differentiate persisters from dropouts. Menzer and Hampel (2009) identified a small group of seniors in a Delaware high school that dropped out *in the last minute*. These students made it to their final year of high school but dropped out before graduating. Bowers and Spratt (2012b) identified a group of dropouts they termed *involved*, with involved dropouts showing the highest test scores, grades, credit accumulation, and extracurricular participation, and the lowest rate of absences. Involved dropouts subsequently had the highest rates of graduation and GED earning, and over 50% applied to postsecondary school. Involved dropouts also reported the highest percentage of interest in graduating from a four-year college or graduate school. The results identifying dropout typologies highlight the heterogeneity that exists within the group of non-graduates and points to the potential benefits of tailoring intervention programs toward specific subgroups. Here, we expand upon the existing theories on dropout and the dropout typology literature to examine a unique group of nongraduates—persisters. We seek to identify differences between persisters and dropouts with regards to both demographic and academic characteristics, as well as longer-term outcomes, including secondary, postsecondary, and early labor market experiences.

1.1. Demographic Characteristics and Academic Preparation of Persisters

Although the effort to examine and describe persisting students is relatively new, there is some recent literature which provides insight into the characteristics of the population relative to on-time graduates. The available research has consistently demonstrated that persisters are more

likely to be from vulnerable or historically marginalized groups than four-year graduates (Hill & Mirakhur, 2018; Uretsky, 2019). For example, immigrant students, Black students, students eligible for free or reduced-price meals (FRPM), and special education students are more likely to be persisters than on-time graduates (Hill & Mirakhur, 2018; Sublett & Rumberger, 2017; Uretsky, 2019). Additionally, persisters have worse academic preparation when compared to on-time graduates, including higher rates of chronic absenteeism and lower scores on standardized tests. Persisters have reported facing many of the life challenges associated with dropout including histories of abuse, homelessness, high rates of mobility and multiple physical and mental health challenges (Hill & Mirakhur, 2018). However, no studies have directly compared the characteristics of persisters and dropouts. This is a crucial point of contrast and a critical next step towards developing targeted interventions that can promote high school graduation among students who do not earn a diploma in four years. In addition, understanding between-group differences amongst non-graduates may provide new knowledge that could improve the sensitivity and specificity of existing early warning indicator models (see Bowers et al., 2013).

1.2 Secondary, Postsecondary, and Early Labor Market Outcomes of Persisters and Dropouts

High school outcomes, including graduation and non-completion, are critical in the life course of students transitioning into adulthood (Elder, 1998; Pallas, 1993; 2003). Due to the large literature on dropouts, and the relatively scant literature on persisters, much of what we know about the secondary, postsecondary, and labor market outcomes of non-graduates stems from the dropout literature. This body of research is both wide and deep, however it is important to exercise care in generalizing the findings on dropouts to persisters. We do know that, along with increased risk of adjudication and less favorable physical and mental health outcomes (Maynard et al., 2015), existing research has consistently documented considerable negative

academic and early labor outcomes for young people who leave high school without a diploma (Kim, 2013; Rumberger & Lamb, 2003). Students with a history of drop out are less likely to enroll in postsecondary, or obtain gainful employment (Berkthold et al., 1998; Berliner et al., 2008), when compared to students who graduate from high school. When previous dropouts do enter postsecondary, they have less favorable educational outcomes, including worse grades and lower rates of earning a postsecondary degree, compared to four-year graduates (Berkthold et al., 1998). Prior research also indicates that previous dropouts, and non-graduates in general, have lower earnings in the labor market when compared to four-year graduates (Kim, 2013; Rumberger & Lamb, 2003; Sum et al., 2009). A substantial body of research has identified similar patterns of postsecondary and early labor market experiences showing a disadvantage for GED earners when compared to four-year graduates (Heckman & LaFontaine, 2006; Jepsen et al., 2016; Rossi, & Bower, 2018).

Some initial exploratory research has provided insight into the near-term secondary, postsecondary, and early labor market outcomes of persisters, dropouts, and on-time graduates. Our recent research (see Uretsky & Henneberger, 2020) used data from Maryland to identify persisting nongraduates and examine the demographic and academic predictors of earning a diploma in the fifth year, with a focus on identifying the characteristics of persisters who ultimately earn a regular high school diploma. We found multiple student-level characteristics (i.e., special education services, passing exit exams, higher attendance) that were associated with earning a diploma in the fifth year. Returning dropouts were less likely than persisters to earn a diploma in year five. In addition, the type and composition of the school a student attended was associated with the likelihood that a student would earn a diploma in the fifth year. Fifth-year graduates had more positive postsecondary and early labor market outcomes in the sixth year

when compared to students who continued to persist or otherwise did not graduate from high school. Specifically, more than two thirds of the fifth-year graduates were enrolled in postsecondary, working, or both in Year 6 compared to just over half of the persisting non-graduates who did not earn a diploma or GED in Year 5.

The twin concepts of motivational resilience and vulnerability may provide a useful lens for understanding the developmental pathways that underlie dropout and persistence (Skinner et al., 2020). One of the pillars of motivational resilience is the concept of academic resilience, which describes the internal systems (e.g. social, emotional) that promote school success in students who face substantial difficulties or risk-factors previously linked to weak academic performance or school failure (Martin & Marsh, 2006; 2009). Researchers in the field differentiate motivational resilience and vulnerability by a young person's response (adaptive vs. maladaptive) to hardships, both large and small, that necessitate coping. An adaptive response to academic set-backs—such as failing a course—could include seeking support or comfort, problem-solving, and eventually persisting, both with the academic subject and on their path towards a diploma. A maladaptive response could include avoidance, isolation, and eventually dropout (Skinner et al., 2020).

1.3. The Current Study

Emerging research conducted using administrative data in New York, California, and Maryland has begun to highlight the demographic and academic characteristics of persisting students and the near-term academic and early labor market outcomes associated with persisting. However, limited research is available that compares the characteristics of persisters and dropouts, largely because, until recently, the research literature has focused solely on dropouts. Yet, comparing persisters and dropouts can help to further differentiate the within group

heterogeneity that exists within nongraduates, helping to further target early prevention and intervention services to help improve secondary, postsecondary, and early labor market outcomes. Here, we extend the initial line of research presented in Uretsky (2019) and Uretsky and Henneberger (2020) to focus on identifying the student- and school-level factors that are associated with persisting versus dropping out in the fourth year.

Additionally, we build upon the extant persisters literature by first taking a descriptive approach to understanding the near-term outcomes of persisters and late dropouts, and secondly taking a multilevel modeling approach to understanding the demographic, academic, and institutional predictors of persisting versus dropping out. Much of the scant prior research on persisters examines persisting, dropping out, and graduating as static outcomes, rather than processes. The current study follows from Rumberger (2011) and the life course persistence theory (Alexander et al., 2001; Dupéré et al., 2015), highlighting that educational outcomes are a process, and as such, we use data visualization to illustrate educational pathways and map the academic and early labor market pathways of persisting non-graduates, including persisters and late dropouts. This approach is beneficial as it allows us to examine all possibilities at each step in the academic and career pathways. Also, we include students who earned a GED to make the critical comparison to dropouts and fifth-year graduates. Our goal is to describe students whose academic pathways are not well-represented in the traditional four-year model of high school completion in order to provide practice and policy considerations to promote eventual graduation and more positive postsecondary and early labor market outcomes.

2. Method

The current study draws on de-identified linked statewide administrative education and labor market data collected by the Maryland Longitudinal Data System (MLDS) Center. The

MLDS Center is an independent agency within the state government and is responsible for linking and housing longitudinal data from the Maryland State Department of Education, the Maryland Higher Education Commission (MHEC), and the Maryland Department of Labor. In-state college enrollment data were provided by MHEC and out-of-state college enrollments were provided by the National Student Clearinghouse. This included public and private colleges and universities as well as community colleges. At the time that the data for the current study was accessed, the MLDS included de-identified individual level data for all students attending public schools in Maryland beginning with the 2007-08 school year (SY) and ending with SY 2015-16.

2.1. Data Protections and IRB

The MLDS Center requires a federal background check and security training prior to accessing data. To protect confidentiality, we did not report descriptive statistics for subgroups that have fewer than 10 students and all percentages were rounded to the nearest whole number (NCES, 2010). In addition, the University of Maryland Baltimore Institutional Review Board (IRB) approved this study and the Portland State University IRB assessed this study to be non-human subjects research and thus exempt from review.

2.2. Measures

2.2.1 Outcome variables

Fifth year (late) graduation is a dichotomous variable indicating whether a student completed the requirements for a Maryland High School Diploma after their expected graduation date, but before August 1, 2014 (Year 5; 0 = No, 1 = Yes). GED is a dichotomous variable indicating whether a student completed the requirements for a Maryland GED before June 2014 (0 = No, 1 = Yes). We used enrollment records to determine whether a student enrolled for a fifth year of high school. Persisting was coded when a student was still enrolled on their expected

graduation date, but had not earned a regular diploma. Dropout was coded when a student formally withdrew from school without reenrolling in a degree granting program by the end of Year 4. For the multilevel modeling analyses, a dichotomous variable was created (0 = Dropout, 1 = Persister).

Next, variables were created to assess whether students from the study sample participated in the labor market in Year 6. Participation in the labor market was calculated by examining quarterly wage records aligned to the school years for Year 5 and Year 6. An indicator of meaningful labor market participation was created by calculating whether a student worked 3 or more quarters in Year 6 (3+ quarters vs. not). Labor market participation is included for students working for employers in Maryland subject to unemployment insurance. The data do not include labor market participation for military service, federal government employment, self-employment, or independent contractors. Finally, a dichotomous variable was created to indicate whether a student enrolled in a Maryland or out-of-state postsecondary institution during Year 6. As a note, students who do not earn a high school diploma or a GED can enroll in some Maryland colleges. For example, at Baltimore City Community College, students who do not have a diploma or GED can enroll, but must earn 15 college credits before becoming eligible for a degree or certificate program (see <https://www.bccc.edu/apply>).

2.2.2 Student Characteristics

The majority of the student characteristics were coded as dichotomous and were measured in high school. The variables examined included gender (male = 0, female = 1), Latinx (vs. not), English language learner (vs. not), Free and Reduced Priced Meals (FRPM) eligible (vs. not; i.e. households with incomes at or below 185% of the federal poverty level or eligible for programs including migrant, homeless, and foster care), special education eligible (vs. not),

and being identified as having experienced homelessness by their school system (homeless vs. not). Just over half of the student population that met inclusion criteria for this study was White (55%) and just over a third was Black (36%). The remaining racial groups ranged from less than one to about four percent and were proportionally equally split across the persister and dropout groups. Therefore, we created three dummy variables for race (Black, White, and Other-race).

School mobility was calculated by assessing whether a student changed schools at least once during the study period (vs. did not). We also included indicators of whether a student had dropped out of school in Years 1-3 (Previous dropout vs. not), had attended fewer than 80% of days in any school year (chronically absent vs. not), or had ever been suspended or expelled (discipline vs. not). Additionally, we examined two variables describing students' academic performance. First, we created a variable (off track) indicating whether the student had sufficient credits to be in the 12th grade in Year 4 (= on-track) and if not, how many years behind the student was at the beginning of Year 4 (11th = 1 year; 10th = 2 years; 9th = 3 years). Secondly, we included an indicator of academic performance on the English high school assessment (HSA), which is an end of course exam that was required for graduation in Maryland at the time of this study. The English HSA is typically taken in the 9th grade. An indicator of passing the English HSA (vs. not) was created.

2.2.3 School Characteristics

School level characteristics describing school type and school size were included (See Table 1). A series of dummy variables were created to describe school type including whether the school was a Traditional High school (=1 vs. not = 0; Reference category), a Combined School (i.e. 6-12th grades; =1 vs. not =0), a Vocational-Technical School (Voc-Tec =1 vs. not = 0), an Alternative School (=1 vs. not = 0), or a Charter School (=1 vs. not = 0). School size was

the total number of students in the school during Year 4 ($M = 1,265.2$, $SD = 719.6$). Of the 198 schools in the study, 70% were traditional high schools, 7% were combined schools, 7% were vocational schools, 11% were alternative schools, and 6% were charter schools.

---Insert Table 1 about here---

2.3. Sample Selection

Students were assessed for inclusion in the study sample if they enrolled in a Maryland high school as a first-time freshman for a period of 90 days or more in Year 1 (SY [School Year] 2009-10) and attended a Maryland High School in Years 4 (SY 2012-13) or 5 (SY 2013-14). Students who transferred out of the Maryland public schools and did not re-enroll during Years 4 or 5 were excluded from the sample (<1%). Students who were seeking a certificate of completion rather than a regular high school diploma were excluded from the sample ($n=132$). As we were ultimately interested in secondary, postsecondary, and early labor market outcomes, students who dropped out in Years 1-3 (early dropouts) and did not reenroll in a Maryland public school by the end of Year 4 were excluded from the sample ($n = 2,660$). Early dropouts may have reenrolled in a private school or a school in another state. Although this is also possible for late dropouts, the degree of bias is likely reduced because of the proximity of dropout to the measurement of the outcome variables. Additionally, we were interested in comparing dropouts to persisters, and late dropouts are more behaviorally similar to students who persist in high school (see research on *lost at the last minute* and *involved* dropouts; Bowers & Sprott, 2012b; Menzer & Hampel, 2009).

Of the 64,130 students in the 2010 cohort of first-time freshman, 82% ($n=51,461$) were enrolled in a Maryland high school in Year 4 and met the inclusion criteria for the study. Ninety percent of the students ($n=46,499$) graduated in Year 4 and 10% ($n=4,962$) did not. After

applying the exclusion criteria, 4,962 students met the final inclusion criteria. Of those students 20% ($n=971$) dropped out during Year 4 and 80% were persisters ($n=3,991$). Table 2 provides the descriptive statistics for Year 4 persisters, late dropouts, early dropouts, and on-time graduates.

---Insert Table 2 about here---

2.4. Data Analysis

Missing data analyses revealed that just over 1% of students had missing data on at least one of the variables included in this study. Listwise deletion was used (Cohen et al., 2003). Attrition analyses indicated that students with missing data were more likely to be Year 4 persisters ($n=53$) than late dropouts ($n=14$).

First, descriptive statistics, including frequencies and proportions were used to describe the patterns of academic and early labor market participation for four-year non-graduates including their fifth and sixth year academic, postsecondary and early labor market outcomes. The descriptive statistics were entered into The Sankey Diagram Generator v1.2 (Acquire Procurement Services, 2019) to illustrate the flow of students in and out of different conditions over time (e.g. enrolled in high school, working), providing an overall summary of participation in school and the early labor market, as well as academic achievements throughout the study period.

Finally, we used a multilevel generalized linear mixed modeling approach for binary data using the GLIMMIX module for SAS 9.3 to examine the predictors of dropout versus persisting among fourth-year high school students. A logit link was used to accommodate the binary outcome (Dai et al., 2006; METHOD=LAPLACE). Students were nested within schools, and between-school differences in the dependent variable were assessed using a varying (random)

intercept model. All student- and school-level characteristics were analyzed as constant (fixed) effects (Gelman & Hill, 2006). We assessed all of the assumptions for the multilevel logistic regression. All student-level parameters were group mean centered (Raudenbush & Bryk, 2002). Fourth-year graduation outcomes were nested in the student's final school of record in their fourth year. We controlled for the third level of nesting (schools within districts) by entering dummy variables for each of Maryland's 24 jurisdictions (districts) into the model and omitting one at random (Huang, 2016).

3. Results

3.1 Academic and early labor market pathways of four-year non-graduates

Tables 3 and 4 present a detailed descriptive analysis of fifth- and sixth-year participation in high school, postsecondary and early labor outcomes for fourth-year non-graduates. The results presented in Tables 3 and 4 were produced using population-level data for the state of Maryland and thus all differences can be treated as true indications of differences present. However, caution should be exercised in generalizing the current results to other cohorts or populations.

In order to better illustrate the academic and early labor market pathways of non-graduates from Years 4 to 6, select descriptive statistics from Tables 3 and 4 were entered into a Sankey diagram (see Figure 1). The figure should be read from left to right. Each line is a to-scale representation of student transitions between conditions over time (e.g. the percentage of Year 4 persisters who enrolled in summer or a fifth-year of high school). It is presented as a historical chronology of the academic and early labor market pathways of non-graduates from Years 4 through 6.

---insert Figure 1 about here---

3.1.1 Continued Enrollment Post-Year 4

Table 3 presents the descriptive result of the continued enrollment patterns post-Year 4 for persisters and dropouts (see Post Year 4 Enrollment). A higher proportion of non-graduates were still enrolled (i.e., were persisters) at the end of the fourth year (80%) than the proportion of non-graduates that had dropped out during the fourth year (20%). More than four-fifths (81%) of all non-graduates enrolled in, and attended, at least one day at a Maryland high school in the summer immediately post-Year 4 or Year 5. A higher proportion of 4th Year persisters (97%) enrolled in summer or Year 5 than late dropouts (14%).

---insert Table 3 about here---

3.1.2 Year 5 High School Completion

Table 3 also presents the descriptive results for Year 5 graduation outcomes for persisters and dropouts (see Year 5 Graduation Status). More than one-third (38%) of the 4th year non-graduates earned a regular high school diploma from a Maryland high school by the end of the fifth year. An additional 4% of non-graduates earned a diploma via GED by the end of the fifth year and nearly two-thirds (58%) had no high school credential by the end of Year 5. Fourth-year persisters earned high school diplomas at nearly 12 times the rates of late dropouts (47% and 4% respectively). Late dropouts, however earned GEDs at more than seven times the rate of fourth year persisters (15% and 2% respectively). A little more than half (52%) of fourth-year persisters did not earn a credential by the end of Year 5 compared to 81% of fourth-year dropouts.

3.1.3 Year 6 Postsecondary and Early Labor Market Outcomes

A little under one in five late graduates (18%) and GED earners (21%) attended a postsecondary institution in the sixth year compared to just 3% of students with no high school diploma or credential (see Table 4). A higher proportion of GED earners (44%) worked at least

three quarters in Maryland's formal, non-federal economy in the sixth year compared to late graduates (38%) and students with no high school diploma or credential (23%). Just under half of the late graduates and GED earners (47% and 45% respectively) neither attended a postsecondary institution nor worked more than three quarters in Year 6 compared to three quarters (75%) of students with no high school diploma or credential.

---insert Table 4 about here---

3.2 *Multivariate Analyses*

The z-test for the covariance parameters ($z = 5.77, p < .0001$) indicated statistically significant between-school variation in persisting versus dropping out, providing justification for the use of MLM techniques (Hox, 2002). The intraclass correlation for the unconditional (null) model was .31, indicating that nearly a third (31%) of the total variation in the odds of dropping out or persisting can be attributed to differences between schools. Results for the multilevel model fitted to evaluate the associations of student- and school-level factors with the odds of persisting versus dropping out in the fourth year of high school are presented in Table 5.

---insert Table 5 about here---

3.2.1 *Student-level factors*

Students who identified as Black were more likely to be persisters than to have dropped out by the end of Year 4 compared to their White peers ($OR = 1.497, p = .001$). In addition, students who were eligible for special education services ($OR = 1.257, p = .019$) and students who had passed the English HSA ($OR = 1.349, p = .001$) had increased odds of persisting versus dropping out. Students with a history of drop out in Years 1-3 ($OR = 0.600, p < .0001$), were behind in credits by one or more years (off-track; $OR = 0.650, p < .0001$) or were chronically

absent in at least one year of high school ($OR=0.381, p<.0001$) were less likely to be persisters than to have dropped out by the end of Year 4. After controlling for other variables in the model, there was no significant relation between being Female ($p=.350$), Other race ($p=.329$), Latinx ($p=.099$), an English language learner ($p=.173$), FRPM eligible ($p=.545$), experiencing homelessness ($p=.500$), changing schools during high school (mobile; $p=.464$) or being suspended or expelled ($p=.783$) and being a persister versus dropping out by the end of Year 4.

3.2.2 School-level factors

Students who attended a combined ($OR=2.357, p=.017$) or a Voc-Tec high school ($OR=2.214, p=.017$) were more likely to persist than dropout by the end of Year 4 compared to students attending a traditional high school. In addition, students who attended larger schools had higher odds of persisting versus dropout ($OR=1.034, p=.005$). After controlling for other variables in the model, there was no significant relation between attending an alternative high school ($p=.589$), or a charter high school ($p=.140$) with the odds of persisting versus dropout.

4. Discussion

Using population-level administrative data from Maryland, the current study applied Rumberger's (2011) conceptual model of academic success and the life course perspective on dropout (Alexander et al., 2001; Dupéré et al., 2015), to the study of persistence and dropout in high school. We used descriptive statistics and data visualization to examine and map the academic and early labor market pathways of non-graduates, including persisting students, who have traditionally been neglected in the research literature. Similar to Bowers and Sprott's (2012b) description of *involved dropouts*, we found that persisters had higher rates of eventual graduation compared to late dropouts. We also found that persisting students had more favorable academic profiles (i.e. passing exit exams, credit accrual) and subsequent school enrollment than

late dropouts suggesting that there may be some parallels between the dropout typology and persisters literature. In addition, students who eventually earned a high school credential had more positive postsecondary and early labor market outcomes when compared to students with no high school credential. Finally, we used multilevel modeling and found several student and school-level factors that related to the odds of persisting versus dropping out in the fourth year of high school.

4.1. Mapping Students' Academic Pathways

Sankey diagramming (Schmidt, 2008), an approach borrowed from engineering, was used to illustrate the fluid pathways for students who do not earn a diploma by their expected graduation date (i.e., persisters and dropouts). This method allowed us to examine key educational and career milestones (i.e., high school diploma; GED; entering the labor market) for persisters and late dropouts, permitting us to examine student movement across several possible academic and labor pathways in a manner that is both detailed and easily interpretable. The Sankey approach is well-suited for illustrating persisting and dropping out as actions or processes, rather than static outcomes, in a manner consistent with prior theoretical frameworks on academic success (see Rumberger, 2011) and the life course perspective on dropout (Alexander et al., 2001; Dupéré et al., 2015).

At the end of the fourth year, persisting students have the potential to enroll in a subsequent year of high school to pursue a diploma, pursue an alternative diploma (e.g. GED), or drop out, and the potential for each action continues into the fifth year and beyond. When academic and early labor market outcomes are treated as static point-in-time (i.e. cross-sectional) outcomes, important information may be lost. For example, lacking a longitudinal perspective, we would not know whether or which dropouts re-enrolled in high school or how their

subsequent journey towards graduation concluded. Additionally, we would miss the population of students who persist without earning a high school credential. Both groups represent key populations for prevention and intervention, the first helping us to better understand how risk is translated into successful academic outcomes, and the latter representing a key group to target for intervention that promotes high school completion.

Our findings demonstrate the importance of differentiating non-graduates into persisters and dropouts, as not all non-graduates dropout, and not all dropouts stay out. The Sankey diagram illustrated disproportionately higher rates of post-Year 4 school enrollment for persisters compared to dropouts, which is consistent with prior research using district-level data in Baltimore and New York City (Hill & Mirakhur, 2018; Uretsky, 2019). This suggests that persisters, who are not identified or longitudinally followed by current state or federal administrative data systems, may be optimal targets for prevention, intervention, and investment of resources. Dropout and persistence may occur for distinct life reasons and differentiating the two early-on may help support educators to promote positive developmental outcomes for both groups (McDermott et al., 2019a).

In the present study, persisters were seven times more likely to re-enroll in high school than late dropouts, a striking disparity that may partially be explained by Skinner's (2020) descriptions of motivational resilience and vulnerability. Whereas a large portion of persisters' responses to adversity (e.g. not graduating on time) could be described as adaptive (e.g. continued enrollment in Year 5); the response of most students who dropped out could be described as maladaptive (e.g. prolonged withdrawal or permanent dropout). However, students who are lost to dropout in the fourth year (i.e. *lost at the last minute* or *involved dropouts*) may represent prime targets for prevention and intervention, as they are likely more involved in

school than early dropouts (Bowers & Sprott, 2012b; Menzer & Hampel, 2009). Dropout is not uniformly maladaptive and leaving school is sometimes necessary for a student to meet their short-term goals such as entering the workforce or taking care of family (Zaff et al., 2016b). In addition, the decision to drop out is often aligned with structural policies and practices that disproportionately impact students from vulnerable subgroups, such as racially and sexually minoritized youth (Morris, 2016). Still, from a life course perspective (Alexander et al., 2001; Dupéré et al., 2015), obtaining a high school credential is an important predictor of a cascade of positive life outcomes that are important to both the young people in question, their families, and the communities they share (Belfield et al., 2012; McDermott et al., 2019b).

In the present study GED earners had the highest rates of postsecondary enrollment with late graduates just a few points behind them. This is inconsistent with prior research showing that GED earners do not enroll in postsecondary at similar rates as high school graduates (Heckman et al., 2011). Here, our focus was on immediate GED attainment, whereas prior research has focused on students who may have earned their GED many years after leaving high school, and such students may have very different academic pathways and motivations for pursuing a GED. For example, in prior studies, GED earners have tended to be older and are likely to have had substantial experience in the labor market or the criminal justice system prior to earning a GED (e.g. Jepsen et al., 2017; Rossi & Bower, 2018). The population in this study, those who earn an immediate GED, are likely closer in age and academic and labor market experience to late graduates than is common in most outcome studies of GED earners. Additionally, GED earners had higher rates of early labor market participation than late graduates. These findings offer initial evidence that early GED earners, at least in the short term, have postsecondary and labor

experiences that are comparable to late graduates and preferable to those who did not earn a high school credential.

Students who had not earned a GED or a high school diploma by the end of the fifth year had the lowest rates of academic and early labor market participation, with almost three quarters not involved in either postsecondary or the labor market. Students who are engaged in either the education system or labor market have improved physical and mental health as well as lower rates of incarceration compared to students who are disengaged (Belfield et al., 2012). Belfield and colleagues highlight the unique opportunity for youth who are disconnected from both school and the workforce to realize their full potential in society and improve future productivity. Apprenticeship training programs may be ideal for these youth, offering on-the-job education and training in specialized workforce industries, building competence and connection to society, while also allowing youth to earn wages to support themselves and their families (Wolter & Ryan, 2011).

4.2. Predicting the Odds of Persisting Versus Dropping Out

After identifying several key differences in post-Year 4 academic and workforce participation for persisters and dropouts at the population-level, we used multilevel modeling to examine the relationships between student and school-level factors with the odds of persisting versus dropping out in the fourth year of high school. Our goal was to provide more nuanced information that could be translated into policies and practices for predicting risk and promoting resilience, leading to academic success. We identified several key findings that may help further target prevention and intervention.

4.2.1 Student characteristics

After controlling for other factors in the model, we found that Black students were more likely to persist than dropout in the fourth year of high school. In general, prior research on dropout typologies and EWIs use race and other demographic variables as controls (e.g. Bowers & Sprott, 2012a) or not at all (e.g. Bowers & Sprout, 2013; Ogresta et al., 2020); instead focusing on malleable characteristics that are “accurate, accessible, actionable, and accountable” (Bowers, 2021, p. 185), meaning that they could be influenced by the student, their family, or the schools they attend (Bowers & Zhou, 2019). However, the larger dropout literature has generally treated demographic characteristics as proxies for wide-ranging inequities (e.g. access to education and healthcare) or economic background, in that the associations between race and outcomes tend to disappear when other socioeconomic factors are included as control variables (De Witte et al., 2013; Rumberger, 2011). This can be observed in two recent studies of persisters that found no relationship between race and the odds of persisting versus on-time graduation (Uretsky, 2019) or the odds of fifth-year graduation among persisters and late dropouts (Uretsky & Henneberger, 2020). Taken together it seems that race does not have a relationship with graduation outcomes—in Years 4 or 5. Conversely, in the present study, Black students were more likely than white students to persist when compared to dropping out, suggesting that schools may be supporting the persistence of Black students, while failing to help them reach the final finish line to graduation.

We also found that students eligible for special education services and students who had passed the English HSA had increased odds of persisting versus dropping out. The relationship between standardized test performance and academic progress is well documented (Rumberger, 2011; Zaff et al., 2016b) and is supported by previous research examining persisting students (Uretsky, 2019; Uretsky & Henneberger, 2020). Interpreting the results for special education

students is a bit more complex. Previous, well-controlled studies have found no relationship between on-time graduation and special education status (Uretsky, 2019; Zablocki & Krezmien, 2013). However, Uretsky & Henneberger (2020) found that special education students had increased odds of earning a diploma in Year 5. Special education services are designed to provide additional adult support and time to promote high school completion among students who may otherwise leave school without a diploma. From that lens it is not surprising that special education students would be more likely to persist rather than dropout. In fact, it may be useful to consider whether borrowing elements of special education programming, such as focused tutoring and structures for providing additional time to pursue a diploma, may be a useful approach for promoting persistence among students at risk for non-completion.

In addition, we identified several factors related to reduced odds of persisting including early dropout experiences, being off-track (behind in credits), and being chronically absent. All three of these factors have previously been associated with increased odds of dropout (Allensworth & Easton, 2007; Rumberger, 2011) or, in the case of previous dropout and attendance, reduced odds of fifth-year graduation (Uretsky & Henneberger, 2020). These findings indicate alignment with the dropout and EWI literature and suggest that the continuum of risk framework (Masten et al., 1993) may be useful for conceptualizing the relationship between persisters, dropouts, and on-time graduates—so that persisters would be located somewhere between dropouts and on-time graduates in terms of level of risk.

In summary, the demographic and academic characteristics identified in the current study may be used to find students who are likely to persist so that practitioners could capitalize on their potential for academic resilience and move them toward successful completion of a high school credential (Skinner et al., 2020). This framework differs from prior research using

empirically based methods (e.g. Allensworth & Easton, 2007; Balfanz et al., 2007; Bowers & Sprott, 2013; Ogresta et al., 2020) because it stems from a resilience (Skinner et al., 2020) and positive youth development (Damon, 2004; Lerner et al., 2009) framework that helps to identify a group of students who are at high risk, but also have high potential for completion. The focus here is not on academic failure, but on academic potential. For example, the demographic and academic characteristics presented here may be used to help identify students who may find success at re-engagement centers, which conduct active outreach to encourage students to participate in and maintain engagement with school (Rennie-Hill et al., 2014). This model hinges on accurate outreach for identifying students who are likely to be successful, a key component of ensuring a justifiable cost/benefit ratio. It may also be useful to revisit the typology (e.g. Bowers & Sprott, 2012b; Ogresta et al., 2020) and early warning indicators literature (e.g. Allensworth & Easton, 2007; Bowers et al., 2013) using a framework that differentiates dropouts and persisters.

4.2.2 School characteristics

We found that nearly a third (31%) of the variance in the odds of dropping out or persisting can be attributed to differences between schools. This is similar to, but slightly larger than, the previous finding that 25% of the variance in the odds of persisting versus on-time graduation was due to between-school differences (Uretsky, 2019). In addition, we found that students who attended a Voc-Tec or Combined School were more likely to persist than dropout compared to students attending a Traditional school. This is consistent with Rumberger's (2011) theoretical model linking school structure to academic achievement. However, previous research examining the odds of persisting versus on-time graduation found no effect for school structure (Uretsky, 2019) and research examining the odds of fifth-year graduation found no effect for Voc-Tec or Combined schools (Uretsky & Henneberger, 2020). The authors did however find

that that students attending alternative schools were less likely to graduate in Year 5 and students attending charter schools were more likely to earn a diploma in Year 5, compared to students attending a traditional high school. From a relational perspective it is not surprising that students who attend combined schools, where students may have begun attending as early as sixth grade, were more likely to persist than dropout. Previous research has demonstrated the importance of consistent adult relationships with preventing dropout (Rumberger, 2011; Zaff et al., 2016b) and promoting persistence (Hill & Mirakur, 2018). It is also not surprising that students who attend a Voc-Tec school, where students are trained in practical job-oriented skills, were more likely to persist. Previous research has linked vocational and technical coursework with reduced dropout and higher rates of high school completion (Plank et al., 2008; Wonacott, 2002).

The present study also found that students who attended larger schools had higher odds of persisting versus dropping out. Although some studies have reported reduced odds of dropout for students attending larger schools, those studies appear to be in the minority (Rumberger, 2011; Wood et al., 2017; Zaff et al., 2016b). Studies examining school size and student outcomes have yielded mixed results overall, with researchers noting that interventions that manipulate school size are often part of comprehensive school reform efforts and thus the specific role of school size is difficult to isolate (Wood et al., 2017; Zaff et al., 2016b).

5. Limitations

The findings from this study should be interpreted within the context of the following limitations. First, using state administrative data provides the benefit of conducting a population-level analysis, however, we were limited to examining enrollments in one state's public-school system. As such, students who dropped out or did not re-enroll in the Maryland public school system may have been enrolled in private school, home school, or a school in another state.

Additionally, the generalizability of our findings is unknown, as our results are limited to the population of students in one cohort in Maryland—a small mid-Atlantic state. Second, the labor market data did not include federal employees, private contractors, self-employees, or out of state employees. This could bias the early labor market results presented in Table 4 if graduation status relates to the propensity to work in one of these sectors. Third, although rates of missing data were very low in the current study, we used listwise deletion to handle missing data and students with missing data were more likely to be persisters. Finally, our analyses should be interpreted as correlational and not causal. There may be unmeasured confounders, such as achievement motivation (Wigfield & Eccles, 2000) that correlate with the predictors of interest in the current study that may also differentiate persisters and dropouts.

6. Conclusion

The current study builds from our prior research on persisters (see Uretsky, 2019; Uretsky & Henneberger, 2020) by using data visualization and multilevel-modeling to identify critical differences between persisters and dropouts. The study was strengthened by the use of linked longitudinal administrative data at the population-level, allowing us to make distinctions between sub-populations of students that are relatively rare in the general population and explore post-high school outcomes, including postsecondary enrollment and early labor market participation. Our findings suggest the likely presence of an unmeasured, but influential, motivational driver that distinguishes persisters from dropouts. It may be worthwhile to consider motivational resilience (Skinner et al., 2020), defined broadly as patterns of action that allow students to constructively deal with, overcome, recover, and learn from encounters with academic obstacles and failure in future research. There is a crucial need for research focusing directly on persisting non-graduates, which explicitly includes both persisters and dropouts, in order to identify

practice and policy levers that support students who persist in their efforts to earn a diploma. This should include both deeper explorations of student profiles, such as qualitative and latent analyses, and attention to the drivers of key decisions, such as continued enrollment or reenrollment in the fifth year, with the goal of targeting prevention and intervention efforts. Moreover, this research is timely as it not only highlights an underexamined population of students but provides new insight into a group that will likely grow in relevance over the coming years as educational systems deal with the fallout of the COVID-19 pandemic and its impact on students' graduation and related outcomes.

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Table 1.

School Level Characteristics (K=198)		
	N	%
High School	139	57
Combined School	13	5
Voc-Tec School	13	5
Alternative School	22	9
Charter School	11	4
	Mean	SD
School Size	1265.2	719.6

Table 2.

Descriptive Statistics for On-time Graduates, Persisters, Late Dropouts, and Early Dropouts ($N=54,121$)

		On Time Graduate ($N = 46,499$)	Persister ($N = 3,991$)	Late Dropout ($N = 971$)	Early Dropout ($N = 2,660$)
		%	%	%	%
Total		86	7	2	5
Female		51	36	37	40
Race	Black	32	64	48	45
	White	51	21	36	40
	Other	17	15	16	15
Latinx		9	15	17	15
Ever ELL		3	5	5	5
Ever FRPM		36	77	76	72
Ever Special Education		9	26	23	22
Ever Homeless		1	5	7	6
Ever Mobile		12	49	51	
Ever Disciplined		13	28	26	27
Passed English HSA		87	38	34	17
Dropout History (Year 1-3)		<1	8	19	
Years Behind	On Track	<99	39	28	
	1	<1	31	28	
	2	<1	22	29	
	3		8	14	
Post Year 4 Enrollment			97	14	2

Note. Students who withdrew from school out in Year 4 are considered Late Dropouts. Students who withdrew from school in Years 1-3 are considered Early Dropouts. ELL = English language learner. FRPM = eligibility for free/reduced price meals. HSA = high school assessment.

Table 3.

Summary of Post Year 4 High School Enrollment by Year 4 Graduation Status ($N=4,962$)

	Year 4 Graduation Status		
	Total	Persister	Dropout
		($n=3,991$)	($n=971$)
%	%	%	
Total		81	19
Post Year 4 Enrollment			
Total	81	97	14
Summer	80	38	<1
Year 5	20	81*	14
Year 5 Graduation Status			
Graduate	38	47	4
GED	4	2	15
No High School Credential	58	52	81

Note. *The denominator does not include the persisters who earned a diploma during summer school immediately post-Year 4 ($n=621$)

Table 4.
 Summary of Year 6 Participation in Postsecondary and Early Labor Market by
 Year 5 Graduation Status ($N=4,962$)

	Year 5 Graduation Status			
	Total	Late Graduate ($n=1,901$)	GED ($n=208$)	No High School Credential ($n=2,853$)
	%	%	%	%
Total		38	4	58
College	10	18	21	3
Worked 3Q+	30	38	44	23
No Participation	64	47	45	75

Note. 3Q+ = Worked more than 3 quarters.

Table 5.

Summary of Results for the Multilevel Logit Model Fitted to Evaluate the Associations between Student and School-level Factors and the Odds of Persisting Versus Dropping out in the Fourth Year of High School ($N=4,962$)

	OR	SE	<i>p</i>	95% CI ^b .	
				Lower	Upper
Level-1 Fixed Effects ^a					
Intercept	2.059	.192	<.0001		
Gender (Female)	.924	.084	.350	.784	1.090
Race					
Black	1.497	.124	.001	1.175	1.909
Other Race	1.167	.159	.329	.856	1.593
Latinx	1.315	.166	.099	.950	1.822
English Language Learner	1.317	.202	.173	.886	1.956
Free and Reduced Priced Meals	.940	.102	.545	.770	1.148
Special Education	1.257	.097	.019	1.039	1.521
Homeless	.892	.169	.500	.641	1.242
Dropped Out (First 3 Years)	.600	.122	<.0001	.473	.762
Mobile	1.070	.092	.464	.893	1.281
Pass English HSA	1.349	.093	.001	1.124	1.619
Off Track	.650	.049	<.0001	.591	.716
Chronically Absent	.381	.093	<.0001	.318	.457
Suspended or Expelled	1.025	.090	.783	.859	1.223
Level-2 Fixed Effects					
Voc-Tec School	2.214	.331	.017	1.156	4.238
Alternative School	1.116	.203	.589	.749	1.662
Charter School	1.650	.339	.140	.848	3.209
Combined School	2.290	.346	.017	1.161	4.514
School Size	1.034	.012	.005	1.010	1.058
Covariance Parameter Estimates					
Intercept	3.870 ^c	.063	<.0001		

Note. Dummy variables for school districts were included in the model to account for the between-district variance in the dependent variable. Estimates for these parameters are not reported. Intraclass correlation for the unconditional (null) model = .31 a. The reference category is 1.00: Fourth-year Persister. b. Confidence Interval for the Odds Ratio. c. z-score. HSA = high school assessment.

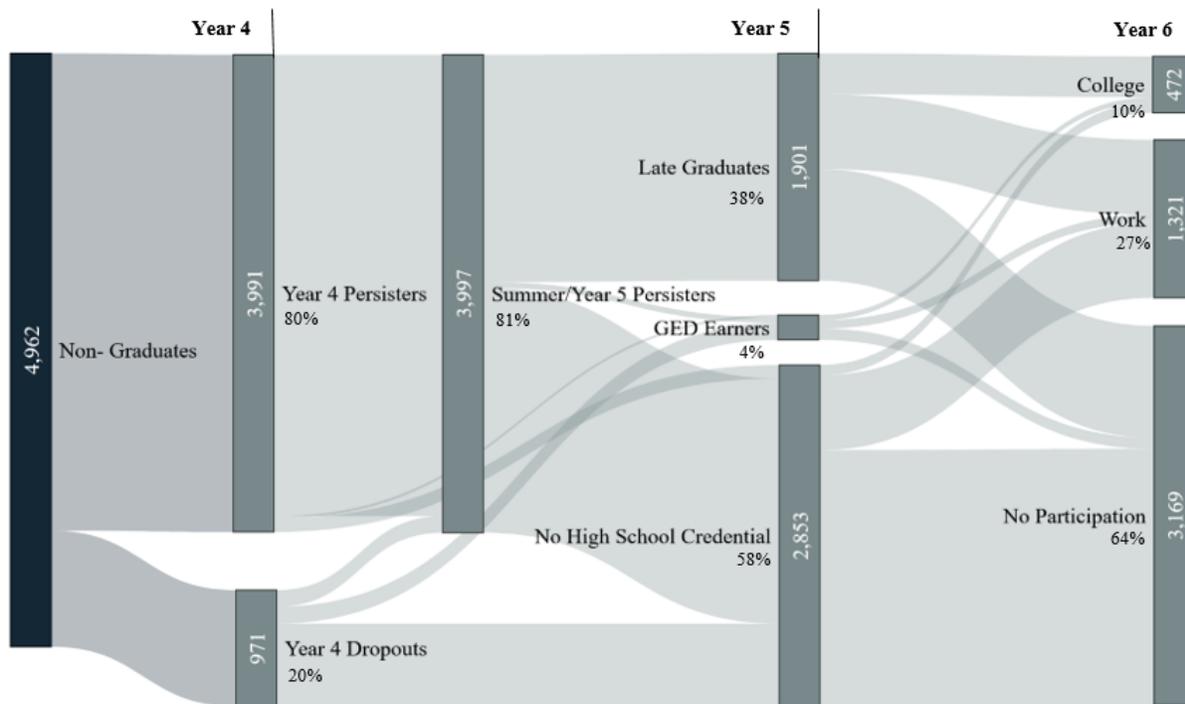


Figure 1. Sankey Diagram of Academic and Early Labor Pathways for Four-year Non-graduates in Maryland ($N=4,962$).